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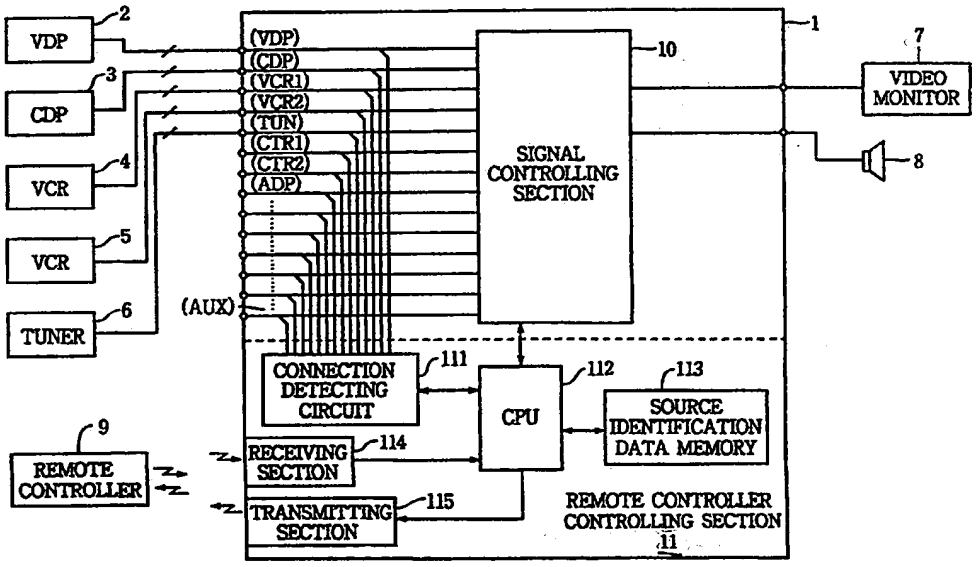
(54) Remote control system for controlling a plurality of devices

(57) A master controller 1 connected to the controlled devices 2 - 6, and a remote controller 9 for controlling operation of each of the controlled devices are provided. A memory in the remote controller stores identities of available devices. The identities (and perhaps manufacturers' identities) of the devices actually connected are transmitted to the remote controller, and it is confirmed that these identities are stored in the memory. Names of the connected controlled devices are displayed on a display for requiring a user to select at least one, and then possible commands are displayed for selection and transmission.

FIG.1



GB 2 275 800 A

FIG.1

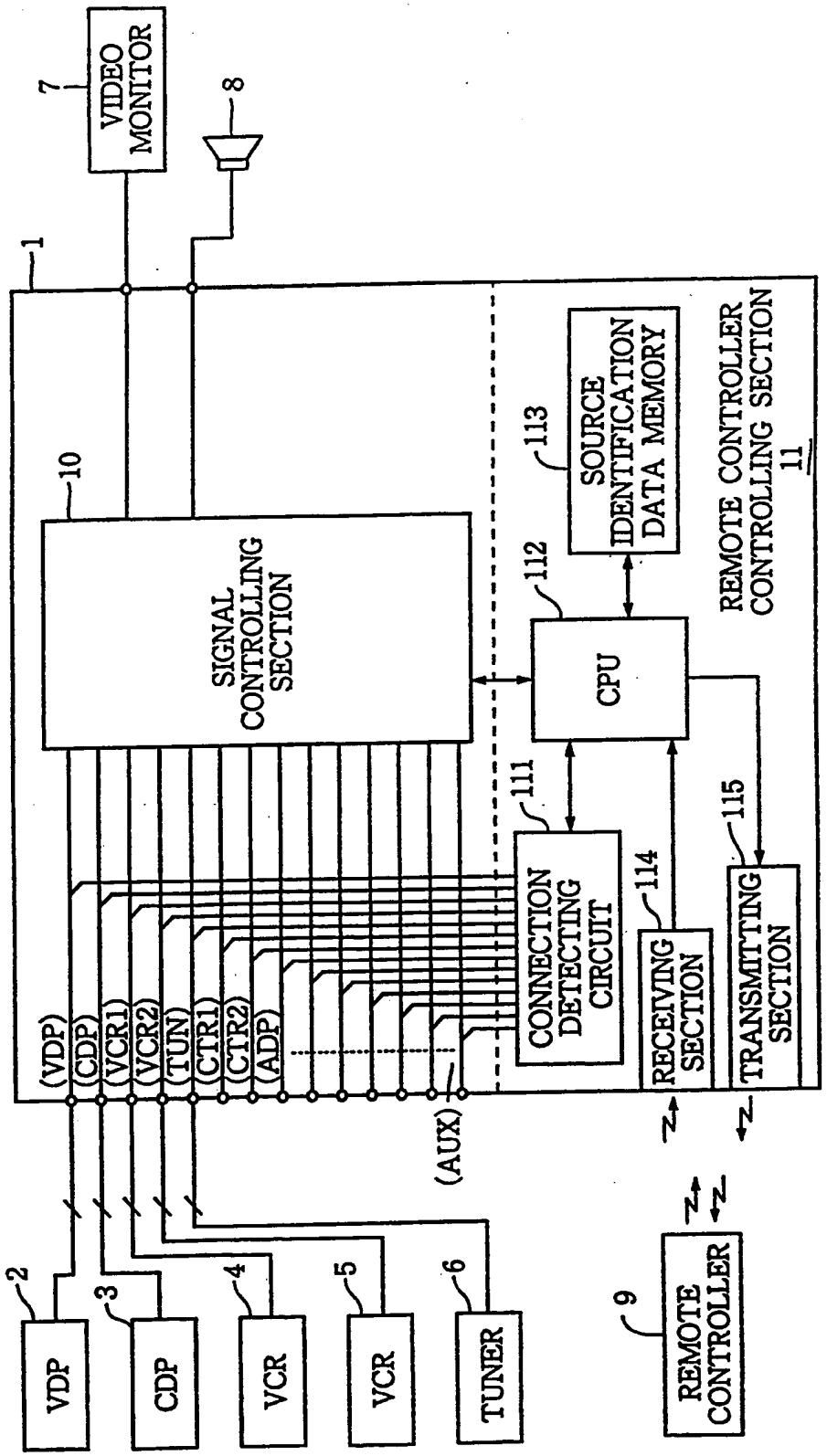

VIDEO MONITOR
7
8
1
10
SIGNAL CONTROLLING SECTION
SOURCE IDENTIFICATION DATA MEMORY
113
112
CPU
REMOTE CONTROLLER CONTROLLING SECTION
11
111
CONNECTION DETECTING CIRCUIT
114
RECEIVING SECTION
115
TRANSMITTING SECTION
(VDP)
(CDP)
(VCR1)
(VCR2)
(TUN)
(CTR1)
(CTR2)
(ADP)
(AUX)
2
3
4
5
6
VDP
CDP
VCR
VCR
TUNER
9
REMOTE CONTROLLER

FIG.2

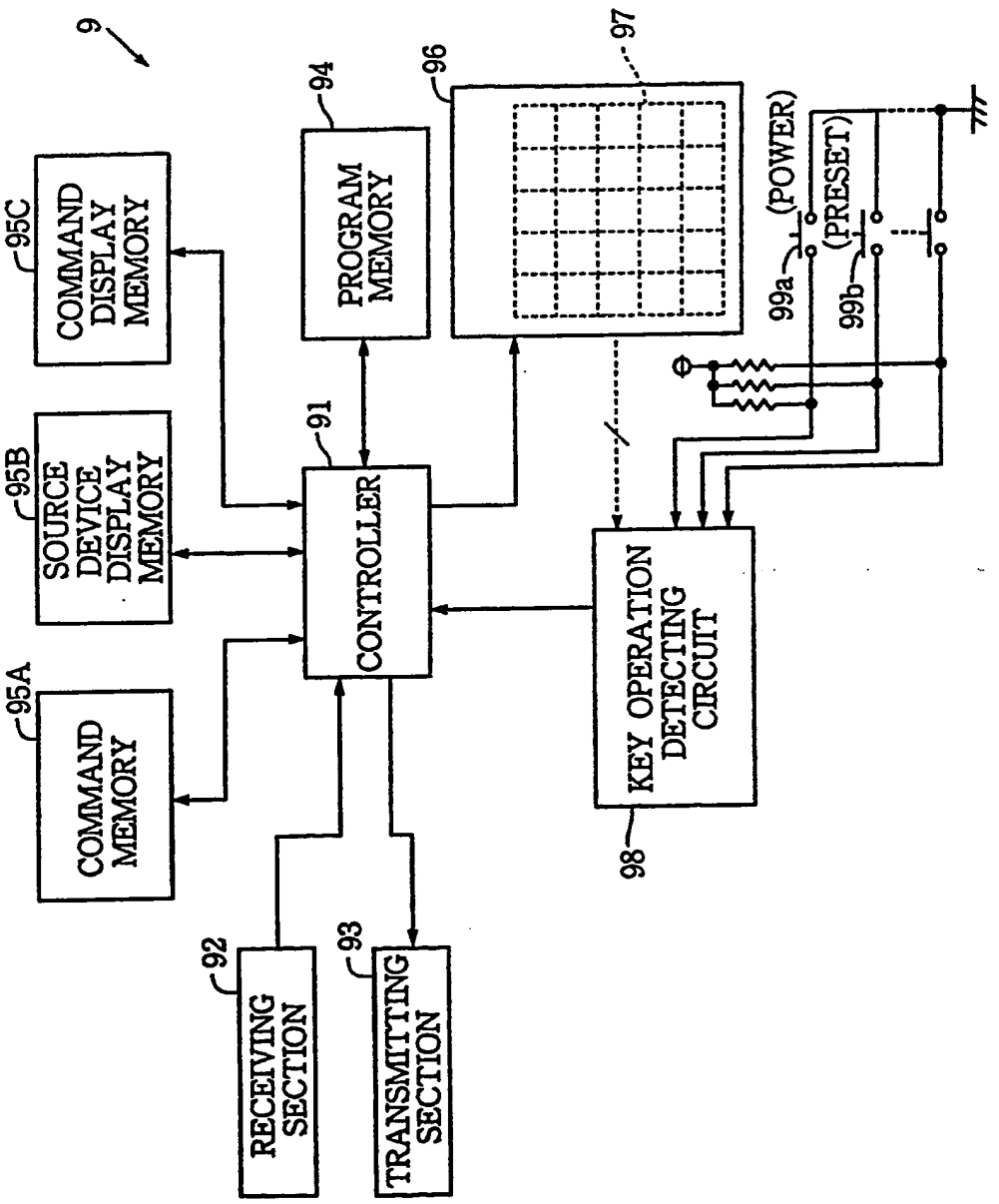

9
COMMAND MEMORY
95A
SOURCE DEVICE DISPLAY MEMORY
95B
COMMAND DISPLAY MEMORY
95C
CONTROLLER
91
PROGRAM MEMORY
94
97
96
KEY OPERATION DETECTING CIRCUIT
98
(POWER)
(PRESET)
99a
99b
RECEIVING SECTION
92
TRANSMITTING SECTION
93

FIG.3a

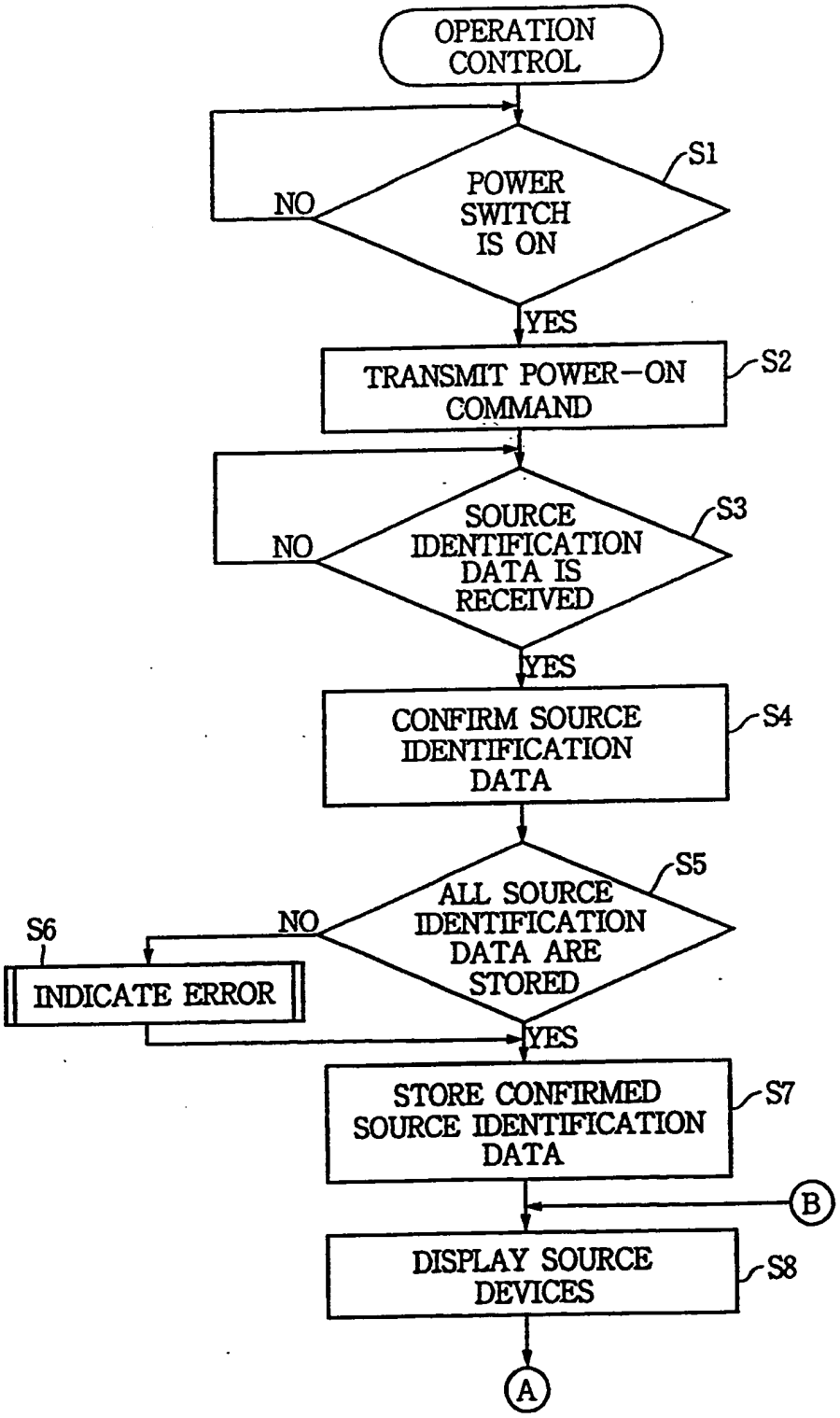

OPERATION CONTROL
S1
POWER SWITCH IS ON
NO
YES
TRANSMIT POWER-ON COMMAND
S2
S3
SOURCE IDENTIFICATION DATA IS RECEIVED
NO
YES
CONFIRM SOURCE IDENTIFICATION DATA
S4
S5
ALL SOURCE IDENTIFICATION DATA ARE STORED
NO
S6
INDICATE ERROR
YES
STORE CONFIRMED SOURCE IDENTIFICATION DATA
S7
B
DISPLAY SOURCE DEVICES
S8
A

FIG.3b

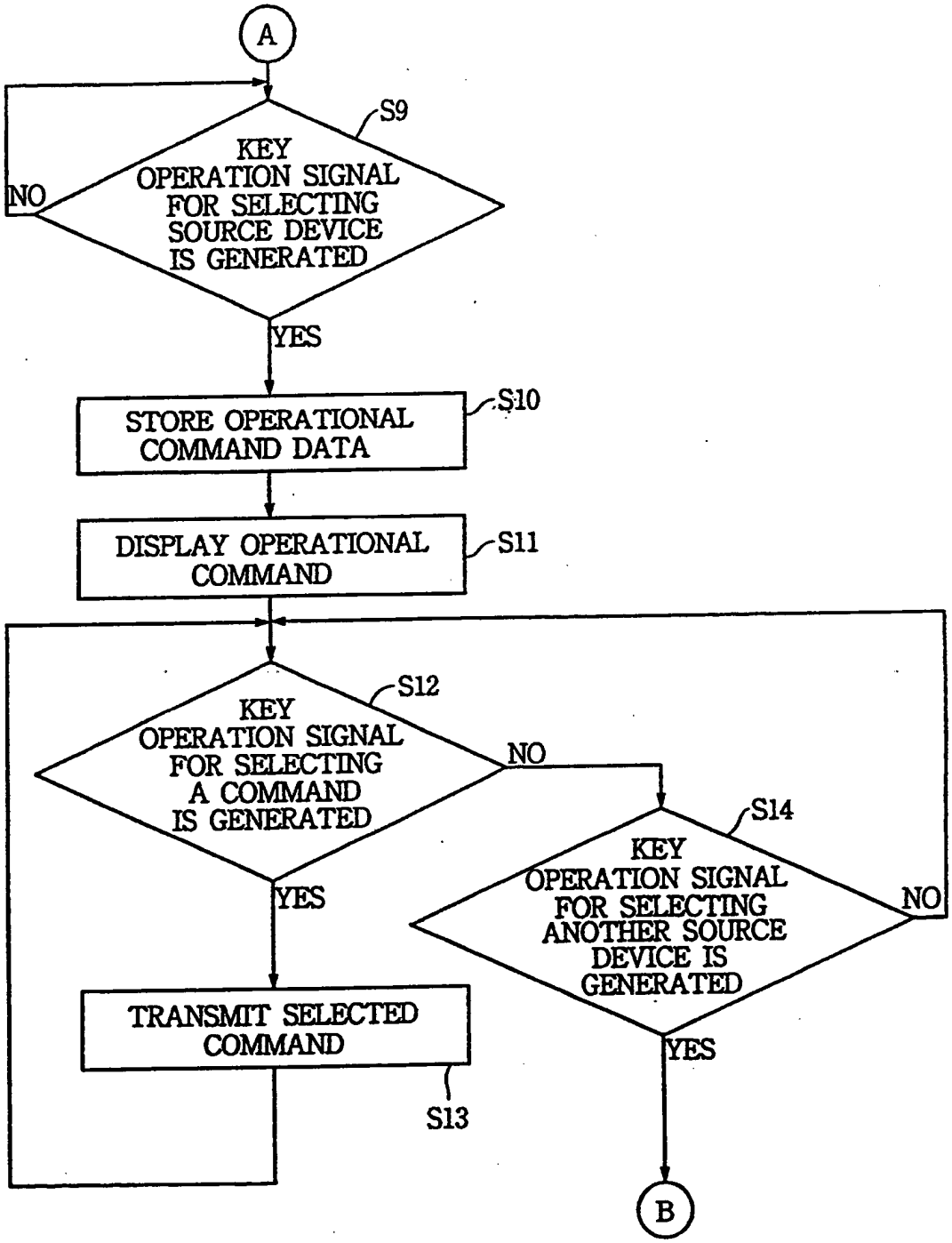

A
S9
KEY OPERATION SIGNAL FOR SELECTING SOURCE DEVICE IS GENERATED
NO
YES
STORE OPERATIONAL COMMAND DATA
S10
DISPLAY OPERATIONAL COMMAND
S11
S12
KEY OPERATION SIGNAL FOR SELECTING A COMMAND IS GENERATED
NO
YES
S14
KEY OPERATION SIGNAL FOR SELECTING ANOTHER SOURCE DEVICE IS GENERATED
NO
YES
TRANSMIT SELECTED COMMAND
S13
B

FIG.4

SOURCE DEVICE	SOURCE IDENTIFICATION CODE
LDP	1
CDP	2
VCR1	3
VCR2	4
TUN	5
CTR1	6
CTR2	7
ADP	8
⋮	⋮
AUX	16

FIG.5

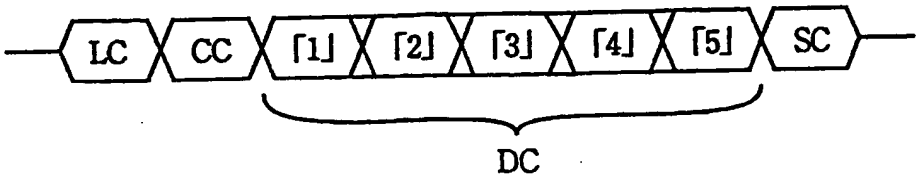


FIG.6

CODE	A11 A12 A13	A55

95A

1	A111 A112 A113	A155
2	A211 A212 A213	A255
3	A311 A312 A313	A355
4	A411 A412 A413	A455
5	A511 A512 A513	A555
6	A611 A612 A613	A655
7	A711 A712 A713	A755
8	A811 A812 A813	A855
⋮	⋮	⋮
16	A1611 A1612 A1613	A1655

FIG.7

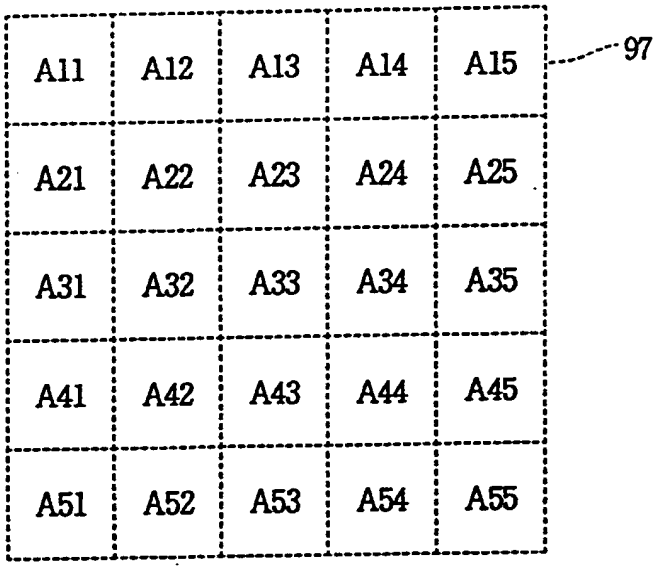

A11
A12
A13
A14
A15
A21
A22
A23
A24
A25
A31
A32
A33
A34
A35
A41
A42
A43
A44
A45
A51
A52
A53
A54
A55
97

FIG.8

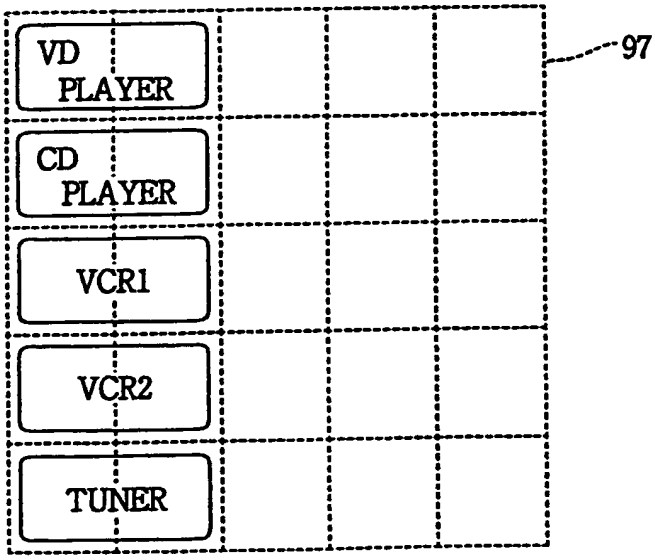

VD PLAYER
CD PLAYER
VCR1
VCR2
TUNER
97

FIG.9

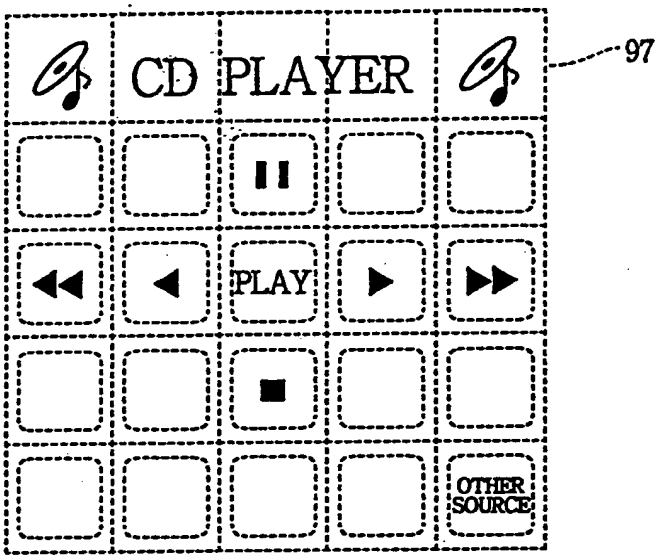


FIG.10

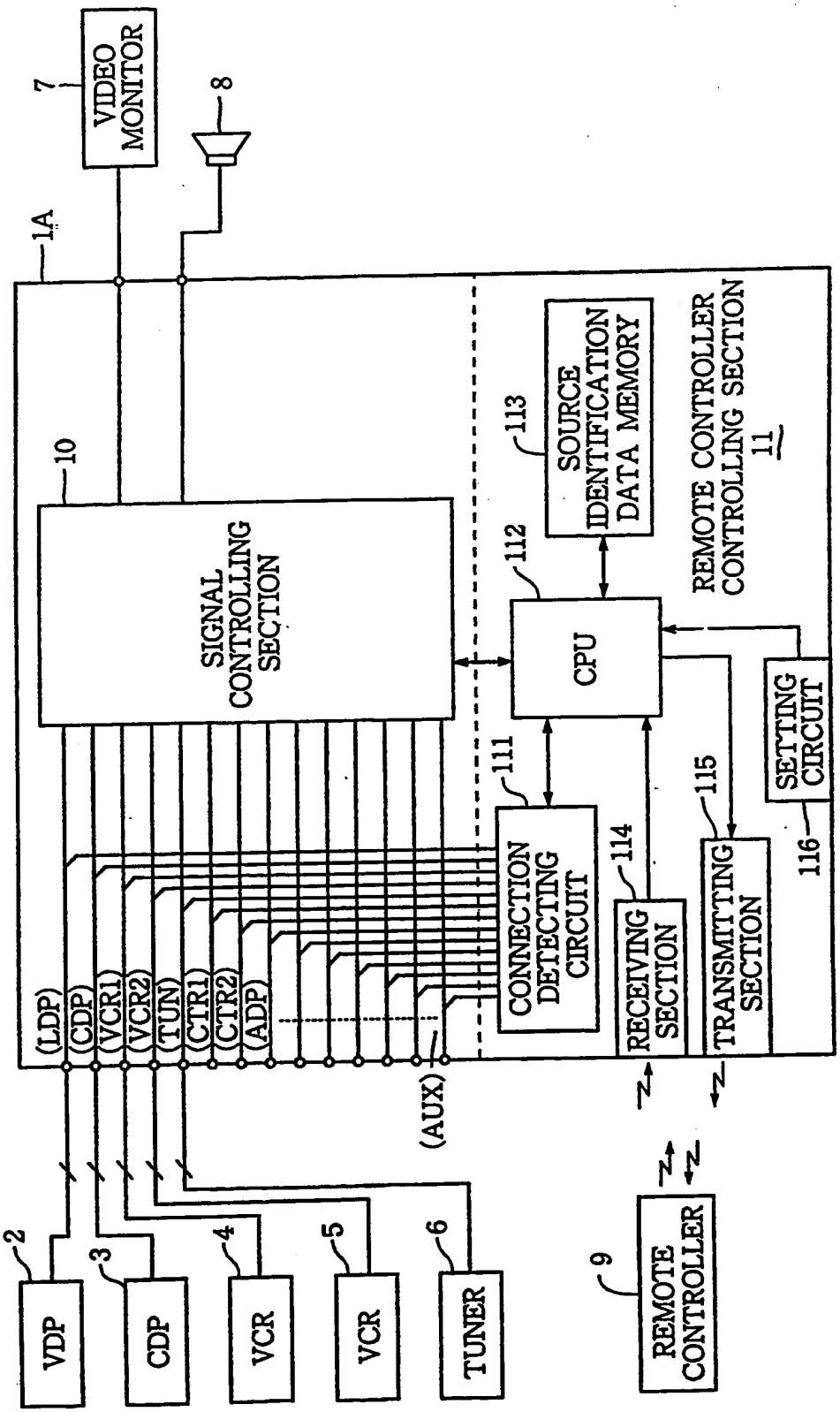
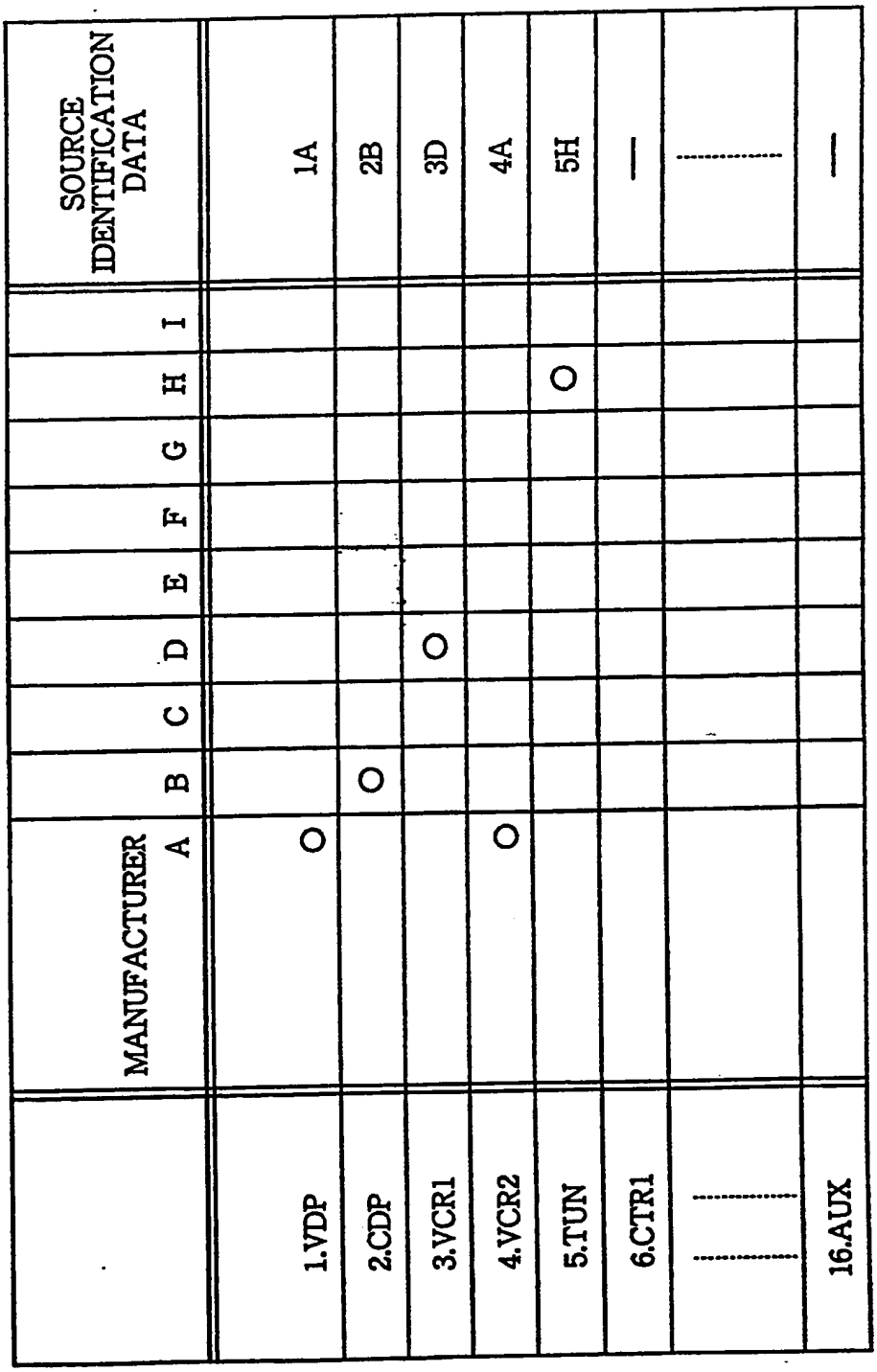

VIDEO MONITOR
7
8
1A
10
SIGNAL CONTROLLING SECTION
SOURCE IDENTIFICATION DATA MEMORY
113
112
CPU
REMOTE CONTROLLER CONTROLLING SECTION
11
SETTING CIRCUIT
116
111
CONNECTION DETECTING CIRCUIT
114
RECEIVING SECTION
115
TRANSMITTING SECTION
(LDP)
(CDP)
(VCR1)
(VCR2)
(TUN)
(CTR1)
(CTR2)
(ADP)
(AUX)
2
VDP
3
CDP
4
VCR
5
VCR
6
TUNER
9
REMOTE CONTROLLER

FIG.11



	MANUFACTURER A	B	C	D	E	F	G	H	I	SOURCE IDENTIFICATION DATA
1.VDP	O									1A
2.CDP		O								2B
3.VCR1				O						3D
4.VCR2	O									4A
5.TUN								O		5H
6.CTR1										—
.....										.....
.....										
16.AUX										—

FIG.12

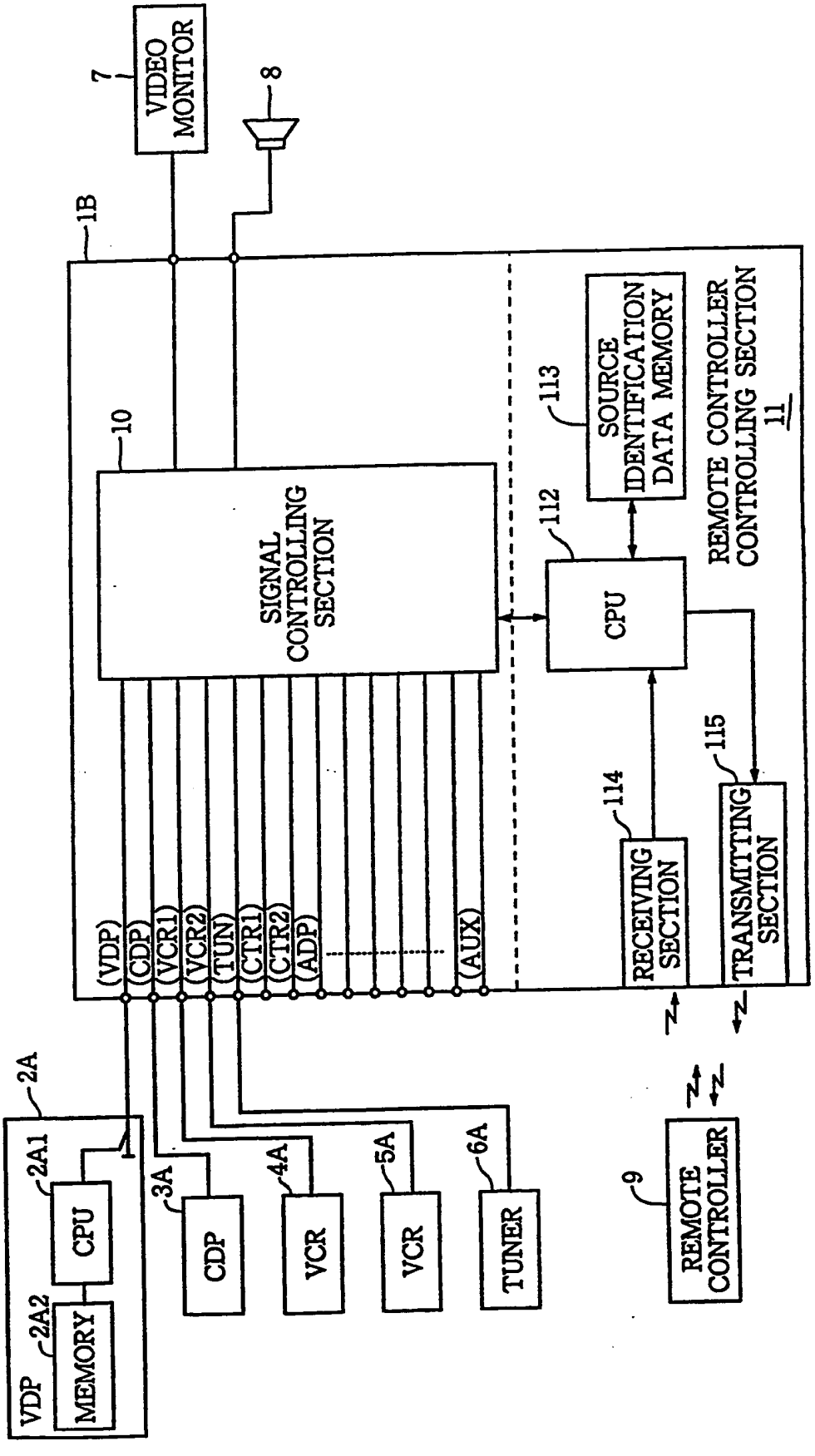
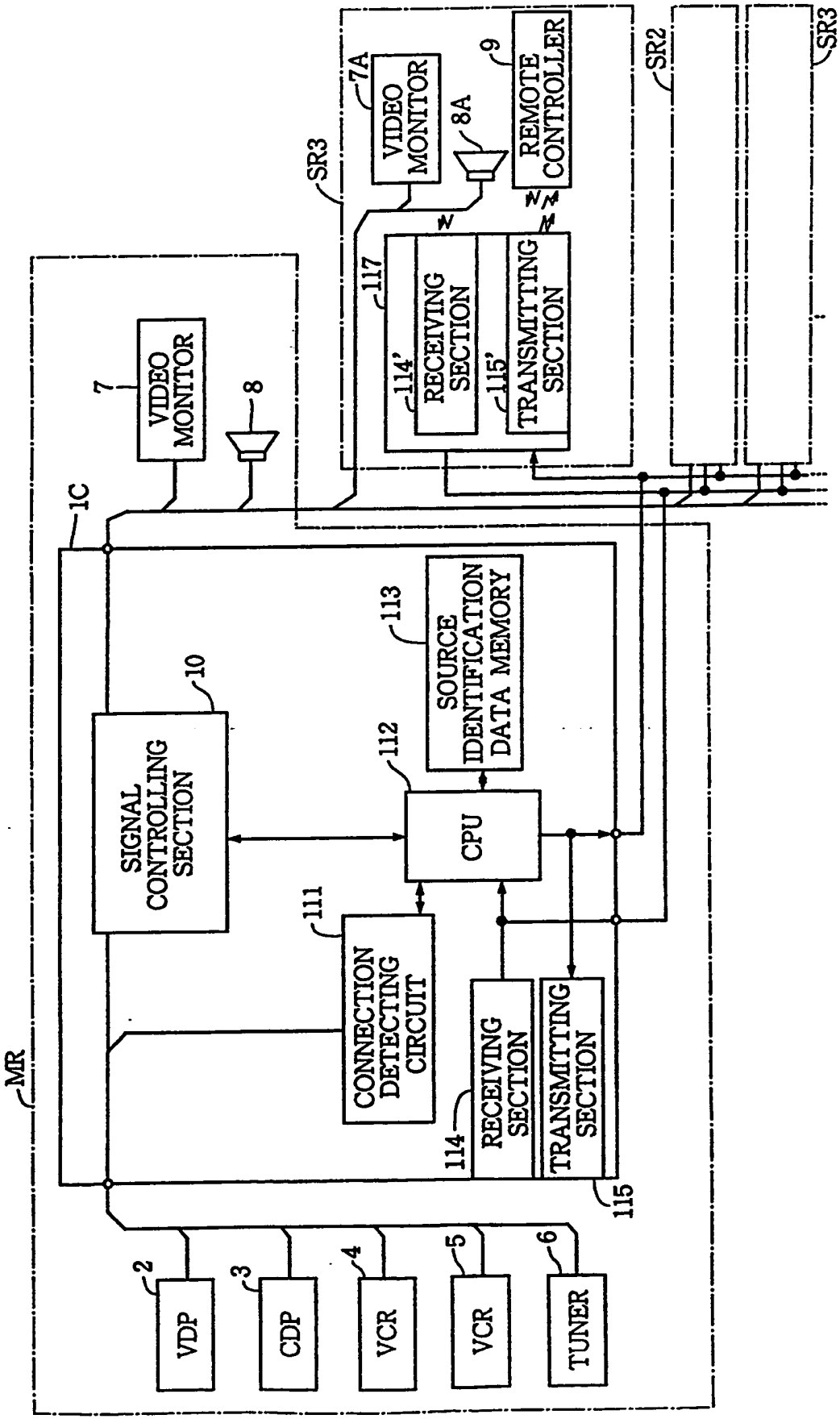

VIDEO MONITOR
7
8
1B
10
SIGNAL CONTROLLING SECTION
SOURCE IDENTIFICATION DATA MEMORY
113
112
CPU
REMOTE CONTROLLER CONTROLLING SECTION 11
114
RECEIVING SECTION
115
TRANSMITTING SECTION
(VDP)
(CDP)
(VCR1)
(VCR2)
(TUN)
(CTR1)
(CTR2)
(ADP)
(AUX)
2A
VDP
2A1
CPU
2A2
MEMORY
3A
CDP
4A
VCR
5A
VCR
6A
TUNER
9
REMOTE CONTROLLER

FIG.13


MR
1C
VDP
CDP
VCR
VCR
TUNER
2
3
4
5
6
SIGNAL CONTROLLING SECTION
10
CONNECTION DETECTING CIRCUIT
111
CPU
112
SOURCE IDENTIFICATION DATA MEMORY
113
RECEIVING SECTION
114
TRANSMITTING SECTION
115
VIDEO MONITOR
7
8
SR3
117
RECEIVING SECTION
114'
TRANSMITTING SECTION
115'
VIDEO MONITOR
7A
8A
REMOTE CONTROLLER
9
SR2
SR3

TITLE OF THE INVENTION

Remote Control System for Controlling a Plurality of Devices

BACKGROUND OF THE INVENTION

The present invention relates to a remote control system, and more particularly to a remote control system for controlling a plurality of devices, such as audio/video (A/V) devices, and a remote controller for transmitting and receiving information signal.

In order to remote-control the operation of an A/V system comprised of a plurality of A/V devices, a remote controller for each A/V device is provided. When a large number of A/V devices is provided, the number of the remote controller must also be increased. Accordingly, it becomes troublesome to handle all of the remote controllers when actually operating the devices.

In order to solve such a problem, there has been proposed a remote control system wherein a single remote controller stores control signals for controlling the A/V devices so that the devices are universally remote-controlled. However, even in such a system, if the number of the A/V devices are increased, the operational keys on the remote controller must be increased. Furthermore, the control signals for the additional A/V devices must be stored by operating the

remote controller. Hence the user is burdened with a complicated operation.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a bidirectional remote control system wherein an A/V system can be easily operated without increasing the number of keys and storing control signals for additional A/V devices.

According to the present invention, there is provided a remote control system for a plurality of controlled devices, comprising a master controller connected to the controlled devices, a remote controller for controlling operation of each of the controlled devices, a memory provided in the remote controller and storing a plurality of commands for a plurality of available devices and identification data on the available devices, first transmitting means provided in the remote controller for transmitting an identification data demand signal to the master controller, detector means provided in the master controller and responsive to the identification demand signal for detecting identification data on each of the connected controlled devices, second transmitting means for transmitting the detected identification data to the remote controller, confirmation means provided in

the remote controller for confirming that the detected identification data are stored in the memory.

A display is mounted on the remote controller and names of the connected controlled devices are displayed on the display for requiring a user to select at least one of the displayed devices. In response to a selection of the user, operation indication is displayed on the display. In response to a command dependent on the operation of the indication, the command is transmitted to the selected controlled device for operation the controlled device.

Other objects and features of this invention will become understood from the following description with reference to the accompanying drawings.

BRIEF DESCRIPTION OF DRAWINGS

Fig. 1 is a block diagram of a bidirectional remote control system according to the present invention;

Fig. 2 is a block diagram of a remote controller of the system of Fig. 1;

Figs. 3a and 3b show a flowchart describing the operation of the remote controller;

Fig. 4 is a table showing an example of identification codes of source devices provided in the A/V system;

Fig. 5 is an illustration showing a format of a remote controller control signal;

Fig. 6 is a map of a command memory provided in the system of the present invention;

Fig. 7 is an illustration showing a touch-sensitive display panel of the remote controller;

Fig. 8 is an illustrating showing the touch-sensitive display panel showing a list of source devices;

Fig. 9 is an illustration showing the touch-sensitive display panel when a CD player is selected as a source device;

Fig. 10 is a block diagram of a second embodiment of the bidirectional remote control system of the present invention;

Fig. 11 is a table showing an example of identification codes of the source devices in the second embodiment;

Fig. 12 is a block diagram of a third embodiment of the bidirectional remote control system of the present invention;

Fig. 13 is a block diagram of a fourth embodiment of the present invention, applied to a multiple room A/V system.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to Fig. 1, a remote control system having a bidirectional communication system according to the present invention comprises a master controller 1 for controlling the entire system and a plurality of A/V devices such as a video disc player (VDP) 2, compact disc player (CDP) 3, first and second video cassette recorders (VCRs) 4 and 5, and a tuner 6. These A/V devices are connected to the master controller 1 through input source signal lines, input and output control signal lines, and power lines. The master controller 1 has a plurality of terminals, VDP, CDP, VCR1, VCR2, TUN, each of which for VDP 2, CDP 3, each of the VCRs 4 and 5, and the tuner 6 respectively. Terminals CTR1, CTR2, and ADP for connecting cassette players and analog disc player, respectively are further provided. The master controller 1 is further connected to a video monitor 7 and a loudspeaker 8 through corresponding terminals and output source signal lines. A remote controller 9 is further provided to operate the A/V devices through the master controller 1.

The master controller 1 comprises a signal controlling section 10 to which various signal lines and power lines from the A/V devices are connected through the terminals, and a remote controller controlling section 11. The signal controlling section

10 has an input/output interface, a selector for selecting one of various input source signals from the A/V devices 2 to 6, CPU for controlling the selector and to generate a source device control signal in accordance with an input control signal and a command signal from the remote controller controlling section 11, and an controller for amplifying the selected input source signal. Output source signals are fed to the video monitor 7 and the loudspeaker 8 through the respective terminals.

The remote controller control section 11 has a connection detecting circuit 111 to which signal lines and power lines from each input terminals connected to the A/V devices are connected so as to detect whether each A/V devices is connected to the master controller or not. Connection detection signals from the connection detecting circuit 111 are applied to a CPU 112 which generates source identification data indicating which of the A/V devices are connected to the master controller 1, dependent on the detection signals. The source identification data are stored in a source identification data memory 113.

The remote controller control section 11 further has a receiving section 114 for receiving a system operation signal from a remote controller 9, and a transmission section 115 for transmitting a remote

controller control signal to the remote controller 9. In response to the system control signal from the receiving section 114, the CPU 112 applies a corresponding command signal to the signal controlling section 10. The CPU 112 further applies the remote controller control signal dependent on the control signal from the signal controlling section 10 and the source identification data retrieved from the source identification data memory 113 to the transmitting section 115.

Referring to Fig. 2, the remote controller 9 according to the present invention has a controller 91 comprising a microcomputer, a receiving section 92 which receives the remote controller control signal from the master controller 1, and a transmitting section 93 which transmits the system operation signal to the master controller, both of which are connected to the controller 91. The controller 91 is further connected to a program memory 94 storing program data, command memory 95A storing a great number of command data of all of available source devices, source device display memory 95B storing the names of the source devices actually connected to the master controller 1, and a command display memory 95c for storing various commands for a source device which the user has selected. The controller 91 is operated to read out

and write data from and in these memories 94, 95A, 95B and 95C.

The remote controller 9 further has a touch-sensitive display panel 96 having a plurality of touch sensors 97 on the display surface thereof, and a key operation detecting circuit 98 connected to a power switch 99a and preset key switches 99b which are disposed outside of the display panel 96. The display panel 96 shows various kinds of information for operating the remote controller 9 in accordance with a display control signal from the controller 91. The key operation detecting circuit 98 operates to apply a key operation signal from the touch sensors 97 to the controller 91. In addition the key operation detecting circuit 98 applies a key operation signal to the controller 91 in accordance with the operation of the power switch 99a and the preset key switch 99b.

The operation of the system of the present invention is described hereinafter with reference to Figs. 3a and 3b. When it is determined at a step S1 that the power switch 99a of the remote controller 9 is closed, the controller 91 feeds a system operation signal which includes identification data demand signal and a power-on command for turning on the source of the master controller to the transmitting section 93 at a step S2. The transmitting section 93 accordingly

transmits the system operation signal to the receiving section 114 of the remote controller control section 11 provided in the master controller 1. The system operation signal is further fed to the CPU 112, thereby turning on the main source of the master controller 1 and sources of the A/V (source) devices 2 to 6 connected to the master controller 1. The connection detecting circuit 111 then applies the connection detection signal indicating the connected A/V (source) devices to the CPU 112. The CPU 112 accordingly stores the source identification data of the devices in the source identification data memory 113. The source identification data are, for example, source identification codes which are shown in the table of Fig. 4. In the present example wherein the VDP 2, CDP3, VCRs 4 and 5, and tuner 6 are connected, the codes 1 to 5 are stored in the source identification data memory 113.

The source identification data and predetermined data are further fed to the transmitting section 115. The transmitting section 115 transmits a remote controller control signal including the source identification data to the receiving section 92 of the remote controller 9. The control signal has a format shown in Fig. 5. The signal comprises a leader code LC indicating the start of transmission, control code CC,

data codes DC, and a stop code SC indicating the end of the transmission. The control code CC shows that the present control signal is for transmitting the source identification data, and the data codes DC are source identification data such codes as 1, 2, 3, 4, and 5 indicating the source devices.

Referring back to Fig. 3a, when the remote controller control signal is fed to the receiving section 92 of the remote controller 9, and further to the controller 91 at a step S3, the source identification data, namely the codes 1 to 5, are extracted from the control signal. The program then goes from the step S3 to a step S4 where it is confirmed that command data for the source devices identified by the extracted source identification data exist in the command memory 95A.

Referring to Fig. 6, the command memory 95A has a map storing the code of each source device, a plurality of operation command data for each source device, and display data for displaying names of the source devices and commands on the sensors 97 of the display panel 96. The display is represented by characters and marks. As shown in Fig. 7, the touch sensors 97 of the display panel 96 are arranged in a matrix to form five rows and five columns of areas A11 to A55. For example, when the sensors 97 are energized, corresponding areas are

operated, thereby showing the names of the connected source devices on the display panel 96 in accordance with the data stored in the command memory 95A.

After it is thus confirmed that the codes of the connected source devices are stored in the command memory 95A, the program goes to a step S5 where the controller 91 further determines whether there is any code in the extracted source identification data which is not stored in the command memory 95A. When there is a code which is not stored in the memory 95A the program goes to a step S6 where the display control signal is applied to the display panel 96 to indicate an error. Thereafter, at a step S7, the controller 91 stores only the codes of the confirmed source identification data in the source display memory 95B.

When all of the codes, namely source identification data are confirmed as being stored in the command memory 95A at the step S5, the program goes directly to the step S7. At the step S7, the controller 91 causes the source display memory 95B to store the identification data of the existing source devices. The names of the corresponding source devices are displayed on the display panel 96 as shown in Fig. 8 (step S8).

The user confirms the source devices in the list of source devices on the display panel 96, and selects

one of the source devices to be operated. More particularly, if the user wishes to select the CD player 3, he touches the area A21 or the area A22 on the panel 97 corresponding to display of CD PAYER shown in Fig. 8. As a result, the key operation detecting circuit 98 generates the key operation signal representing the selected source device, and feeds it to the controller 91. Therefore the program proceeds from a step S9 to a step S10 where the operational command data on the selected source device are stored in the command display memory 95C. In the present example where the CD player is selected, the code 2 of the CD player as shown in the table of Fig. 4, and the corresponding display data A211, A212... A225 shown in Fig. 6 are derived from the command memory 95A. The display data are stored in the command display memory 95C. The program then proceeds to a step S11 wherein the name of the selected source device and keys each representing an operational command thereof are shown on the display panel 96 based on the display data A211, A212 ... A225. For, example, the display panel 96 gives an indication as shown in Fig. 9. The user, then selects one of the operational commands, and accordingly touches the corresponding area to operate the CD player.

When the user touches the display panel for operation, the key operation detecting circuit 98 applies the key operation signal to the controller 91. When the key operation is detected at a step S12, the program goes to a step S13 where the system operation signal executing the operational command is fed to the main controller 1 from the transmission section 93. The system operation signal is applied through the receiving section 114 to the CPU 112, which in turn applies the source device control signal through the signal controlling section 10 to operate the corresponding source device. Namely, in a CD player operating mode, the area A33 shown in Fig. 7 is touched to start the CD player 3.

When the key operation signal is not fed to the controller 91, the program goes from the step S12 to a step S14 which determines whether a key operation signal for selecting another source device is generated. If another source device is to be selected, the user touches an area A55 shown in Fig. 7 so that the key operation is fed to the controller 91. The program accordingly returns to the step S8, where the list of all of the source devices connected to the master controller 1 is shown on the display panel 96. If the selection of the source device is not to be changed, the program returns to the step S12 where the

controller 91 awaits the key operation by the user for operating the selected source device.

Thus, in accordance with the present invention, when the power switch is turned on, the source identification data on source devices connected to the master controller 1 is transmitted to the remote controller 9, which indicates the data on the display panel thereof. The remote control system can be easily adapted to increase the number of the source devices without complicating the operation by the user.

The presently described embodiment may be modified to apply the source identification data not right after the power switch 99a shown in Fig. 2 is closed, but after the preset switch 99b is closed. In the modification, the present system can be effectively operated even if the connection of the source device to the master controller 1 is changed after the power is turned on.

Furthermore, the source device display memory 95B and command display memory 95C may be obviated, in which case the information to be displayed on the remote controller 9 is stored in the command memory 95A.

The second embodiment shown in Fig. 10 is adapted to an A/V system wherein the manufacturers of the source devices differ from each other. In addition to

the components of the master controller 1 of the first embodiment, a master controller 1A of the second embodiment further has a manufacturer setting circuit 116 comprising rotary dip switches (not shown). The number of the switches corresponds to that of the input terminals of the master controller 1A. Each of the rotary dip switch has a plurality of notches A to I, each corresponding to a manufacturer of the A/V device. When connecting the source devices to the master controller 1A, the rotary dip switches are set to the manufacturer of each source device. A manufacturer setting signal generated by the setting circuit 116 is applied to the CPU 112.

The CPU 112 detects the source devices connected to the master controller 1A in accordance with the connection detection signal from the connection detecting circuit 111 and the manufacturer setting signal from the setting circuit 116 as shown in a table of Fig. 11. The circle shown in the table indicates each of the source devices connected, and the manufacturer thereof. More particularly, the source identification data memory 113 stores a code such as 1A for a VDP of a manufacturer A, a code 2B for a CDP of a manufacturer B, a code 3D for a VCR of a manufacturer D, and et cetera. In the present embodiment, the command memory 95A must store command data for

operating each source device in accordance the manufacturer.

Hence, in accordance with the second embodiment, the source devices produced by any manufacturer can be incorporated into the A/V system.

The setting circuit 116 may be modified to generate the source identification data, thereby obviating the connection detecting circuit 111.

Referring to Fig. 12, a master controller 1B of the third embodiment of the remote control system has not the connection detecting circuit 111 in the previous embodiments. A VDP 2A of the present embodiment comprises a CPU 2A1 connected to the master controller 1B through the corresponding terminal, and a memory 2A2 connected to the CPU 2A1 and storing data indicating the type of the A/V device and the manufacturer thereof. Each of the other source devices 3A to 6A are also provided with a CPU and a memory.

When the power switch or the preset key switch of the remote controller 9 is turned on, the CPU 112 in response to the power-on command, or a preset command, applies a data transfer command signal through the signal controller 10 to the VDP 2A, demanding the transfer of the data stored in the memory 2A2. The CPU 2A1 accordingly reads out the data from the memory 2A2 and transmits the data to the CPU 112 through the

signal controller 10. The data on other source devices 3A, 4A, 5A and 6A are transmitted to the CPU 112 through the same operation, thereby producing the source identification data.

Referring to Fig. 13, the fourth embodiment of the present invention is applied to a multiple-room A/V system wherein the A/V devices are provided in a plurality of rooms. A master controller 1C having the same construction as the master controller 1 of the first embodiment, a plurality of source devices 2 to 6, the video monitor 7, and the loudspeaker 8 connected to the master controller 1C are installed in a main room MR. In a sub-room SR1, a remote controller transmitter/receiver 117, a video monitor 7A, a loudspeaker 8A, and remote controller 9 are provided. The video monitor 7A and the loudspeaker 8A are connected to the signal controller 10 of the master controller 1C so as to be applied with the source signals.

The remote controller transmitter/receiver 117 has a receiving section 114' having the same function as the receiving section 114 of the master controller and a transmitting section 115' as the transmitting section 115. The receiving section 114' and the transmitting section 115' of the remote controller are connected to the receiving section 114 and transmitting section 115

respectively through signal lines. Hence the transmission between the remote controller 9 and the master controller 1C can be carried out. The video monitors 7A, loudspeakers 8A, and the remote controller transmitter/receivers 117 are also provided in other sub-rooms SR2, SR3, and et cetera.

Hence, when the user is in one of the sub-rooms SR1, SR2, and SR3, the source devices 2 to 6 in the main room MR can still be controlled with the remote controller 9. Moreover, it is possible for the user to recognize which source device can be operated.

The present invention may be further applied to a system having devices other than A/V devices.

From the foregoing it will be understood that the present invention provides a remote control system having a bidirectional communication system wherein the source identification data and command data for operating the devices are shown on the display provided on the remote controller. Thus, the number of the devices in the system can be increased without increasing the number of the operational keys on the remote controller, or operating the remote controller to store the command signals of the newly incorporated devices. Thus, the operability of the remote control system is improved.

While the presently preferred embodiments of the present invention have been shown and described, it is to be understood that these disclosures are for the purpose of illustration and that various changes and modifications may be made without departing from the scope of the invention as set forth in the appended claims.

WHAT IS CLAIMED IS:

1. A remote control system for a plurality of controlled devices, comprising:

a master controller connected to the controlled devices;

a remote controller for controlling operation of each of the controlled devices;

a memory provided in the remote controller and storing a plurality of commands for a plurality of available devices and identification data on the available devices;

first transmitting means provided in the remote controller for transmitting an identification data demand signal to the master controller;

detector means provided in the master controller and responsive to the identification demand signal for detecting identification data on each of the connected controlled devices;

second transmitting means for transmitting the detected identification data to the remote controller;

confirmation means provided in the remote controller for confirming that the detected identification data are stored in the memory;

a display mounted on the remote controller;

first displaying means for displaying names of the connected controlled devices on the display for

requiring a user to select at least one of the displayed devices;

second displaying means responsive to a selection of the user for displaying operation indication on the display;

third transmitting means responsive to a command dependent on operation on the indication for transmitting the command to the selected controlled device for operating the controlled device.

2. A system according to claim 1 further comprising

a device memory for storing detected identification data.

3. A system according to claim 1 wherein

the display has touch sensors for sensing the selection of the user.

4. A system according to claim 1 wherein

the first transmitting means operates to the identification data demand signal in response to closing of a power switch of the remote controller.

5. A remote control system substantially as described herein with reference to the drawings.

Patents Act 1977
Examiner's report to the Comptroller under Section 17
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Databases (see below)
(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

(ii)

Documents considered relevant following a search in respect of Claims :-
1-5

Categories of documents

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Category	Identity of document and relevant passages	Relevant to claim(s)
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